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Herald of Air Defense

No 9, September 1962

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Decrees of the Presidium of the Supreme Soviet USSR (p 2)

Abstract:

By decree of the Presidium of the Supreme Soviet USSR, 18 August 1962, Major Andriyan Grigor'yevich NIKOLAYEV and Lt Col Pavel Romanovich POPOVICH were awarded the titles Hero of the Soviet Union and Pilot-Cosmonaut USSR.

The New and Magnificent Victory of the Soviet People, Editorial (3-6)

Abstract:

Congratulates, in the name of PVO servicemen, Pilot-Cosmonauts Maj NIKOLAYEV and Lt Col POPOVICH for their joint space flight of 11-15 August 1962. Describes Soviet successes beginning with the first artificial earth satellite, through the flight of GAGARIN and TITOV up to the flight by NIKOLAYEV and POPOVICH.

States that the Soviet Union had surpassed the achievements of the US not only in the duration of such flights and the number of orbits, but also in the perfection of equipment. Points out that the American Cosmonaut Carpenter had "perspired profusely during his short flight in space, literally suffocating in his cabin" while Soviet cosmonauts experienced no such difficulty. Praises Soviet scientists, engineers, and technicians whose "creative genius" made space flights possible.

States that US public figures had asked why the US could not duplicate such feats. Quotes the Italian journalist Arminio Sacioli to the effect that the US "lacks socialism," and there there is "envy" between scientists, businessmen, military personnel, and politicians which "made difficult the training of Glenn and Carpenter."

States that the precepts of V. I. LENIN and the leadership of the Communist Party have changed "backward Russia into a mighty socialist power."

States that the fact that GAGARIN and TITOV are Russians, that NIKOLAYEV is a Chuvash, and that POPOVICH is a Ukrainian is evidence of the fact that "the friendship of the peoples of the Soviet Union is unbreakable." States that difficulties "are not strange to those people who have grown with the Leninist Party in its heroic revolutionary traditions, and are no barrier."

States that Soviet space flights are to be used only "for the peaceful exploration of space," but that the US is "exploring space with the goal of preparing aggressive war" and that the Soviet Union must not be taken unawares.

Quotes N. S. KHRUSHCHEV: "one would have to be a blind man or fool to attempt to thrust upon us his capitalist order and with the aid of a threatened or unleashed war to compel the people to swerve from the path of socialism. If these fools from the imperialist camp desire to put their aggressive thoughts into practice then it will be an act tantamount to the suicide of capitalism. The socialist countries possess not only the means of destroying the capitalist world but even surpass them in armament. And we are ideologically strong, as never before, because our ideas are held not only by the peoples of the socialist countries, but also the ideas of Marxism-Leninism have penetrated deeply into the consciousness of the progressive peoples of the entire world." Notes that the PVO strany Troops are inspired by the feat of NIKOLAYEV and POPOVICH and "are undertaking a new increase of responsibility in socialist competition. Directs commanders, political organs, and party and Komsomol

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organizations to lead this enthusiasm of personnel and "direct it toward eliminating present shortcomings in the organization of equipment training, in maintaining military discipline, and in improving political and educational work." Concludes that the "importance of the missions assigned to PVO Strany Troops by the Communist Party and the Soviet state requires from us the highest vigilance and combat readiness, irreproachable discipline and organization."

<u>Carefully Train and Educate Young Officers</u> -- by Maj Gen I. A. SHARYPKIN (7-12)

Summary:

The basis for training command, political, and engineer cadres of the Soviet Armed Forces lies in the education of young officers, hence shortcomings in their education are being critically examined. Experience shows, however, that most young officers conduct their work in an original and responsible manner.

On the initiative of Sr Lt DENISENKO, technician for a rocket podrazdeleniya, "all operators mastered the apparatus maintenance requirements of technicians within a short time.

Sr Lt KOLESNIKOV, chief of a radar station, has instituted "full [job] interchangeability within crews and sections." Job interchangeability is now being widely utilized by rocketeers, airmen, radio operators, drivers, and other specialists.

The transition from officer candidate to commander is difficult. Since the level of combat readiness in a unit is determined by the status of combat training and military discipline, helping a young officer at the beginning of his service is a necessity. An atmosphere whereby young officers are motivated to increase their knowledge and experience should be created in all units.

When a group of school graduates arrived at one chast' they were greeted by the commander, his deputy and a political worker, questioned on their knowledge of equipment, and given a lecture on the armament of the chast' and on political-educational work. Before departing for a company the young officers met with leading personnel of the chast' and had talked with instructors and officers their own age who had already served in a chast' for a year or two.

After the young officers had been in the company for a month, weekly meetings concerning training and political-educational work were held. Prior to the meetings, preliminary training was conducted by the chast' commander, political workers, and Komsomol workers, permitting them to judge the quality of the young officers through personal contact rather than through questionaires or reports.

Senior and more experienced officers can well understand the difficulties confronting young commanders their first time on the job. Their speeches on training, particularly those on the education of "difficult" subordinates, including officers, were heard with interest by the young officers. There were many shortcomings, for example, in the conduct of Sr Lt KHRULEV. He appeared before an officer's court of honor, was given another chance, was made to understand that everything depended upon himself and then he "made the correct conclusions." The fact that an officer is young and inexperienced does not mean that his job should be made easier, since "only calm, level, and just demandingness towards subordinates, the encouragement of creative initiative, and the competent and timely evaluation of the actions of a young officer can instill in him a real sense of responsibility toward his assigned job, a high regard for himself, for initiative, and for sharpness." For example, when it was seen that Sr Lt GRIGOR'YEV, chief of a radar station, was unable to properly organize his duties, the chast' commander took it upon himself to help the officer by teaching him how to plan his time correctly, how to determine what problems were most important, and to regularly depend upon his sergeants.

But there are some commanders who react to the shortcomings of young officers only "through punishment and a dressing down," which often does great harm. Other officers display callousness toward subordinate officers and are indifferent to their needs. It is not always possible to assign a young officer to an apartment, but to look after his living conditions and to see that he is actively involved in work from the first day and does not experience particular difficulties in becoming organized are the obligations of the commander and political workers. "The party teaches that living facilities are neither trivial nor secondary things. Commanders and political workers should remember that no manner how established a man is, it is living conditions that in the main determine his work, attitudes, and results." Some officers rarely visit companies under their command and then, only to examine documents in which everything appears normal.

The personal example of senior commanders is particularly important in the training of young officers. Leaders who "are conceited and who believe themselves infalible" lose authority in the eyes of their subordinates.

Some senior officers misinterpret the program of the CPSU concerning "the necessity of establishing maximum effort in the work of officers." They assign young officers duties that normally should be carried out by enlisted personnel, and which inevitably leads to the disorganization and weakening of all educational work. Officers must not be unreasonably overworked. Conversely, the friendly relationship of senior officers with junior officers has a positive influence. Young officers go to Officer ALISEYCHIK with their questions because they see in him a strict but sensitive and solicitous commander.

There are still some cases where young officers maintain careless attitudes towards their ideological growth. Commanders, political workers, and senior officers must not only set a personal example in their daily work, but must also instill in young officers an awareness of the need to read political and technical literature. Commanders and political workers must be particularly careful in choosing leaders for political work, since in those instances where political affairs are conducted on a low ideological level the inexperience of young propagandists is most often the same.

The work which is being done in units and officer's clubs to equip young officers with the foundamentals of pedagogy and physcology is sufficient for the present but it is necessary to institute a series of lectures, to better propagandize the experiences of leading young officers in the press, and to be more fully concerned with the requests and needs of young officers, to show fatherly concern with their well being, the regulation of the work day, and the creation of situations to facilitate the creative growth and comprehensive development of their initiative.

Engineers and Technicians Are Involved in Educational Work -- by Lt Col N. S. D'YAKOV (13-15)

Excerpts:

As a result of the development and perfection of combat equipment, the role of engineer and technical personnel in the troops has grown immeasureably. Now there are no chasti and podrazdeleniya in the PVO Strany Troops which do not have specialists with secondary technical or higher engineering educations. Each year the number of officers in this category, fulfilling the duties of podrazdeleniya commanders and crew chiefs in radar stations, is increasing. This means that the circle of educated engineers and technicians has greatly increased and they have been assigned the mission of training and educating subordinates. But to accomplish this it is necessary that each of them possess high party qualities, and the ability to seek the support of the army society in their work, to be actively involved in the training, service, and lives of servicemen, and to influence the formation of high political and moral-combat qualities in the armed defenders of the Motherland.

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Knowledge of the work of leading engineers and technicians shows that they execute these difficult but distinquished tasks well. In Nth Chast', for example, a majority of the engineers and technicians are members of agitation and propaganda groups, report groups, and work in ideological missions, and are non TO instructors. Many of them head Marxist-Leninist training and political affairs groups, teach in evening Party schools, are elected leaders of party and Komsomol organs, and establish clubs and literary councils....

The Party Committee pays particular attention to the question of educating engineer and technical personnel to conduct individual work with subordinates and develop their ability to seek the support of the community....

The Party Committee constantly controls the training engineers and technicians to conduct political classes for soldiers and sergeants....

The political section also devotes much attention to the training of engineer and technical personnel and to practical political and educational work. It summarizes and disseminates the experiences of leading engineers and technicians and periodically conducts seminars in which practical questions on the training and education of personnel are discussed....

Undoubtedly, by involving attracting engineers and technicians in educational work there are inherent shortcomings. The basis for this lies in the still low effectiveness of all measures which have been taken. To eliminate this and other shortcomings it is necessary that all engineers and technicians become skillful educators of servicemen. Commanders, political organs, and party organizations see in this one of their primary missions.

Communists Are Advocates of Organization and Order -- Lt Col L. A. PAVLOV (16-20)

Abstract:

Discusses methods used in fighter aviation chasti to insure accident-free flights. Describes the strict attitudes of chast' and podrazdeleniya commanders towards negligence in the work of pilots, technicians, or mechanics; the work of party organs which hold meeting to ensure that "documents which regulate flight work" are strictly followed; the work of the party committee with specialists of the engineer-aviation service and its response to negligence and carelessness in the work of aviation specialists; and the lectures of a "report group, in which there are 16 commanders, pilots, engineers, and technicians highly trained in theoretical relationships."

Let Us Increase the Effectiveness of Political Training -- Maj A. M. REZNICHENKO (21-24)

Abstract:

Discusses the importance of improving political awareness and moral and combat qualities of Soviet servicemen through political training, on the premise that "with the modern level of technological development even one man, violating the requirements of regulations and manuals can negate the efforts of the entire podrazdeleniya to execute a combat mission."

Enthusiasm for the Job -- Maj N. V. PODKOVYROV (25-26)

Abstract:

Discusses methods used by Capt YUKHNOVICH, commander of an officer candidate company, to encourage and train students at the Krasnoyarsk Radiotechnical School.

In the Interest of the Efficient Combat Training of Personnel -- Maj Gen Avn I. M. MOROZ (27-29)

Excerpts:

"...Recently senior commanders, chiefs, and workers of political organs and party committees are striving to spend a significant part of their time at gun positions, airfields, command posts, and in barracks. However, their visits to podrazdeleniya do not always bring the hoped for results.

"Experience shows that the work of senior commanders in podrazdeleniya is effective when it is not conducted haphazardly, but in a planned, purposeful manner, if it is not limited to disclosures of shortcomings, but takes measurements to correct them, and if it provides time for work with personnel....

"Great significance is attached to the education of sergeants in chasti, which work is to be basically carried out in podrazdeleniya....

"Characteristically, in the present training year among the leaders of groups of Marxist-Leninist training, more than 40 percent are chast' commanders and staff workers. This shows a marked influence on the improvement of the quality of officer's political training...."

<u>The Company Remains Outstanding</u> -- Maj I. Ye. LEBEDEV and Capt P. N. MIGUN (30-31)

Abstract:

Describes training methods used by Capt N. TSYBUL'SKIY, radar company commander, which led to his being awarded the medal for Combat Services by decree of the Presidium of the Supreme Soviet USSR, in February 1962.

<u>The Flight of An Aircraft at Dynamic Altitudes</u> -- by B. T. GOROSHCHENKO, Doctor of Technical Sciences (32-35)

Text:

The dynamic altitudes of an aircraft are usually those altitudes above the absolute ceiling. The ability of an aircraft to attain such altitudes is explained by the possibility, well known to every pilot, of intensively gaining altitude by decreasing speed or, conversely, drastically increasing speed by losing altitude. This phenomenon can be explained by the following.

The mechanical energy E, of an aircraft in flight, is divided into the potential, energy which equals the product of the weight of the aircraft G at altitude H, and the kinetic, energy which equals the product of the mass of the aircraft $\frac{G}{q}$ times half of the square of the speed:

$$E = GH \quad \frac{GV^2}{2q}$$

The specific energy He, which each kilogram of weight of an aircraft possesses, will be G times less than E. It is measured in meters and is the sum of the physical altitude H and the kinetic altitude ($Hk = \frac{\hat{V}^2}{2q}$). It follows that it will be written thus:

$$He = H \quad \frac{V2}{2q}$$

If the thrust of the engine is equal to the head resistance, then the total energy, which the aircraft possesses, in accord with the law of the conservation of energy, will remain unchanged. Accordingly, kinetic energy can be turned into potential energy. Thus, when there is continuous equality of thrust to head resistance, an aircraft, which has begun to execute a chandelle from altitude H and velocity V, the latter down to zero, would obtain an altutude increase of $Hk = \frac{V2}{2q}$. If velocity does not decrease to zero, but changes from Vberg to Vend, then the increase of altitude through the loss of velocity will, obviously, equal $\frac{V^2_{beg} - V^2_{end}}{2q}$ (in the expression Hk velocity is carried in meters per second).

If in the process of the maneuver the thrust of the engine P will be less than head resistance Q, then according to the law of the mechanics of energy, which the aircraft possesses, it will decrease at a quantity equal to the product of the mean value P - Q times the length of the trajectory of the manuever L.

An increase of altitude at the expense of a decrease of kinetic energy is always greater than the loss of altitude He_{loss} caused by excess of head resistance over thrust and is equal to He loss $= \frac{(P-Q)meanL.}{G}$ Thus, if when attaining dynamic altitudes the engine works with the "afterburner" at all times, then He loss constitutes 20-30 percent of the increase in altitude as a result of the decrease of velocity. Turning off the "afterburner", which usually occurs at very high altitudes, induces a higher quantity of loss increase.

Extremely important is the fact that during high speed flight the same (speed) decrease causes a significantly greater increase in altitude than during low speed flight. For example, a speed decrease from 2000 to 1900 kmph without consideration of He_{loss} leads to an altitude increase of 1530 meters, but a decrease of speed from 1000 to 900 km/hr increases the altitude by only 740 meters.

Thus, during high speed flight the achievement of significantly dynamic altitudes is fully possible and requires a relatively small loss of speed.

Of no little importance to the attaining of dynamic altitudes is the correct execution of maneuver by the pilot. As is well known, striving intensively to increase altitude, he makes a vertical climb. The trajectory [of the climb], which ends at the dynamic altitude, does not have a rectilinear section and therefore entry into a vertical climb immediately becomes a departure from it (fig. 1). Such a maneuver must of course be executed when entering with G force p_u greater than one, and departing with a G force of less than one. When attaining dynamic altitudes the final speed of the vertical climb is always less than the initial speed. To attain the greatest altitude at a given decrease of speed while executing a vertical climb, the climb should be executed in accordance with the law of the change of G force, according to which the loss of energy (P-Q)mean L would probably be least.

Testing has shown that minimum loss of energy when executing a vertical climb takes place in those cases, if when departing from it with a G force of a quantity close one, it gradully decreases to a value close to zero and by the nature, the change, as shown in figure 2, must not be negative.

Upon entry into a vertical climb the G force at first grows more intensive as the altitude increases, to that point at which the climb is supposed to terminate. The higher the vertical climb is completed, the greater its maximum steepness must also be, characterized by the angle Omax (fig. 1). Computations show that the value O max is approximately proportionate to the altitude gained upon of execution of the vertical climb. Similar dependence exists between the altitude gained during vertical climb and the maximum G force which upon entry is decreased to one.

If a pilot finding it necessary to increase altitude, above the altitude ceiling, acquires too much G force upon entry and makes the vertical climb with excessive steepness, then upon departure from the climb a negative G force will be imparted to the aircraft. Accordingly, the loss of energy increases. Therefore, correct piloting during a vertical climb will serve to execute it with a smooth change of G force upon departure from a value, close to one, to a quantity a little greater than zero.

The increase in energy loss when executing a vertical climb with a negative G force is explained by the following. The head resistance of the aircraft Q, as is well known, consists of the sum of the contoured and destructive Qo and the inductive Q_i resistances. Q_i is inversely proportionate to the square of the speed of flight and the density of the air, and directly proportionate to the square of the G force. While executing a vertical climb, speed is decreased while altitude increases. Both promote the increase of inductive resistance. When entering a vertical climb inductive resistance increases and as a result the G force is more than one. This increase can be compensated by a decrease of inductive resistance when departing from the vertical climb. It is necessary to execute a departure with a G force, which has changed from a value equal to the cosine O max to a quantity close to zero. When the G force is equal to zero the inductive resistance also will be equal to zero. With a negative G force, lying between zero and minus one, the vertical climb gains in steepness, although inductive resistance is slight. Therefore, G force and energy loss increase during entry.

If the coefficient of the lift C_y of the wing of the aircraft is not limited by determined quantities, depending upon the Mach number (but exceeding these quantities causes a disruption of the flow from the wing and shaking of ailerons and the tail assembly, which the pilot senses at the control stick), then it is more advantageous to begin the vertical climb from an altitude and speed at which the energy of the aircraft is maximum (fig. 3, point A).

To attain very high dynamic altitudes with regard for C_y, limited by shaking, begin the vertical climb as advantageously as possible with great speed and at an altitude less than the ceiling by several thousand meters. The less the dynamic altitude, which must be reached the closer is the most advantageous altitude for beginning the vertical climb and the altitude where the energy of the aircraft is maximum. In figure 3, the line ABC depicts the highest flight speed at the dynamic altitudes attained when executing a vertical climb with minimum loss of energy. The dotted line, passing through point A, characterizes the changes of velocity with altitude, during which the energy of the aircraft remains constant (the decrease in kinetic altitude H_k is compensated by an increase in H). The distance between this curve and the curve AD, taken on the vertical axis, characterizes the quantity of loss in dynamic altitude. These losses are caused by the fact that when maneuvering, the mean quantity of the difference in thrust and head resistance is negative. It can be considered, that the presence of the stated loss decreases the increase in maximum altitude, counting out from the absolute ceiling, by 20-30 percent.

After executing the vertical climb the aircraft begins horizontal flight. When entering such an attitude of flight at the end of a vertical climb the pilot must increase the angle of attack in order that the G force will increase from close to zero to equal one. Otherwise the aircraft cannot perform horizontal flight since the lifting force of the wings will be less.

If the vertical climb is completed at a altitude and speed, characterized by point C (fig. 3), then that required for horizontal flight, C_y, will be equal to its maximum value, by which, as a result of the derangement of the flow from the wing, causes shaking. At this altitude flight is decelerated due to the fact that at dynamic altitudes thrust is less than head resistance and will be intolerable as long as the decrease in speed requires a C_y greater than the maximum. At altitudes lower than point C the aircraft pilot maintains a constant altitude, flying with a continuous decrease of speed and increase in the angle of attack and C_y. Such a flight will continue to the speed limited by the curve EC. At lesser speeds C_y will be greater than Cy_{max} and the pilot will experience shaking at the controls. For a number of aircraft, the altitudes at which horizontal flight with deceleration is possible, are limited by the curve KB. It is determined by the necessity of the longitudinal balancing of the aircraft. Let us explain the reason this limitation arises.

Every aircraft at low flight speed, as a result of the pilot pulling the controls toward him, is capable of attaining any C_y right up to C_y.pos (sic) [probable error for pred = maximum]. During supersonic speeds there occurs an intensive displacement of the point of application of the resultant aerodynamic forces backward toward the wing. Under these conditions even the full movement of controls [toward the pilot] does not always lead to the attainment of a C_y, equal to the C_y max at which shaking occurs, and to the balancing of the aircraft on this C_y. An aircraft can be in balance only under the minimum values of C_y. This leads to the fact that because of the absence of balancing the horizontal flight of the aircraft at altitudes in excess of those defined by curve KB will not be possible.

The area limited by curves AB, BK, KE, and EA is the area of dynamic altitude at which horizontal flight is possible. It may be expanded by: displacing the limit of AC at great speed, achieved primarily by increasing the maximum Mach number authorized and attainable by the aircraft; displacing of the limit EC toward the lesser speeds, which is possible as a result of decreasing the load on each square meter of wing or of increasing the maximum value of C_y; increasing the altitude, at which the limit KB lies, by means of increasing the angle of declination of the stabilizer, displacing the center of gravity backward or increasing the load on each square meter of wing of the aircraft.

The further the range of horizontal flight with deceleration at dynamic altitudes and the further the continuation of such a flight, the greater the initial speed, lying on the curve AB (fig. 3) and the lower the final low speed, lying on the curve EK. The length of the line of decelerated flight is proportionate to the difference of V^2beg and V^2end, and the time V_{beg} and V_{end}. The indicated expressions decrease with the increase of dynamic altitudes therefore, the range and duration of decelerated horizontal flight will be less the greater the dynamic altitude of flight. Switching off the afterburner of the engine will materially decrease the range and duration of such a flight.

If the dynamic altitude does not strongly exceed the absolute ceiling, the range of horizontal decelerated flight will be extremely great. Let us take an example. As calculation shows, a supersonic fighter can, having begun a vertical climb at an altitude less than an absolute ceiling of 1000 to 1500 meters with a speed of 2200 to 2300 kilometers per hour, complete it at an altitude exceeding the altitude of absolute ceiling by 3000 meters when the speed is approximately 2000 kilometers per hour. The length of the trajectory of the vertical climb will be equal to roughly 40 kilometers, 0 max 9°, and the greatest G force will be 1.20 - 1.25 during entry.

Horizontal flight at the attained altitude with "afterburner" and with a decrease of speed from 2000 kilometers per hour to 1200 kilometers per hour, the fighter will fly approximately 150 kilometers. It appears that the fighter's range of flight at dynamic altitudes is sufficient for combat.

Executing a turn in a horizontal plane will decrease the duration and line of trajectory of such a flight. It is particularly disadvantageous to execute a turn with a bank of more than 30 - 35°. This is explained by the fact that when turning in a horizontal plane the G force $pu = \frac{1}{\cos \text{gamma}}$. Inductive resistance is proportionate to p^2. Therefore, a turn with a bank of 30° increases inductive resistance by 1.33 times, and with a bank of 60° - 4 times.

As cited in the above example it is necessary to turn at 120° even when optimum G force reduces decelerated flight time by 2 times. A turn at 180° will either be impossible or will significantly decrease the duration of flight at the dynamic altitude.

Having attained the speed, lying on the limit EK (fig. 3), the aircraft must assume curvilinear flight with a p_u of less than one. It will begin to lose altitude. Performing a flight with a p_u close to one, the pilot can slowly decrease altitude and speed in accordance with the stated curve EK. Under less G force the altitude will decrease more intensively and the speed may increase. Performing a vertical climb, during which the loss of energy is minimum, the greater the altitude, the less the end speed of the vertical climb. What limits the value of this speed? To receive the value p_u, during which energy loss is minimum, the pilot must impart to the aircraft a determined angle of attack and preserve it by moving the controls. The moment, occurring from the deviation of the control organs, is proportionate to the size of the pressure head (skorostnyy Napor) $\frac{\rho V^2}{2}$. Increasing altitude and decreasing speed leads to a decrease in the size $\frac{\rho V^2}{2}$. An aircraft may be controlled when the minimum value of the pressure head corresponds to an earth speed of 100 kilometers per hour.

A reading of one of the needles of modern flight speed indicators is proportionate to the pressure head, but the speed scale had been set for conditions at sea level. From this it follows that minimal flight speed at dynamic altitudes, according to such an instrument, equals 100 kilometers per hour.

The change of speed with altitude when speed according to the instrument is 100 kilometers per hour is shown in figure 3 by curve MN. It is obvious that point N will determine the highest altitude attained, since a further increase will lead to loss of aircraft control. This altitude is also considered to be the dynamic ceiling of the aircraft.

The altitude record of aircraft flight, which was accompanied by the attainment of the dynamic ceiling, belongs to the Soviet Union. It was set by pilot G. MOSOLOV, achieving an altitude of 34,200 meters in the aircraft Ye-66.

It is necessary to emphasize that for the reason stated earlier the aircraft will attain only altitudes of dynamic ceiling, performing the flight on the trajectory shown in figure 4 [sic. No figure 4 accompanies the article] and is not in a condition at this altitude to continue the flight. Therefore, combat employment of a fighter at altitudes and speeds lying between the curves MN, NCB, and EKB (fig. 3), in our opinion, are hardly practical.

Formerly it was shown that the area of dynamic altitudes is regarded as the increase of maximum permitted value of the Mach number since accordingly the limit AB (fig. 3) is displaced to the right to greater speeds. It also increases by lowering the G forces by the squared meter of wing, which is displaced to the limit EK to the left, and the limit KB -- upwards at greater speeds.

Comparing between themselves the US fighters F-104, F-105, F-106, the english fighter "Lightning," and the french "Mirage III," it is possible to state that the F-106 possesses the greatest area of dynamic altitudes, having an M_{max} of approximately 2.2-2.4 and a load on each squared meter of wing of approximately 200 kil/m^2. Although in its time the fighter F-104 set a world altitude record, the area of dynamic altitudes of horizontal flight for this aircraft is extremely small. This is explained by the exceptionally great load on the wing, reaching 480 kil/m^2. For a fighter having a mean value $\frac{G}{S}$ = 320 kil/m^2 the flight altitude with one and the same C_y will be roughly 2500 meters greater than for the F-104. The area of dynamic altitudes of the other fighters occupies an intermediate position bewteen the altitudes of altitudes for the F-106 and the F-104 fighters.

A good knowledge by flight personnel of the peculiarities of flight at dynamic altitudes will enable successful mastery by them of modern aviation equipment and maximum utilization of their combat capabilities.

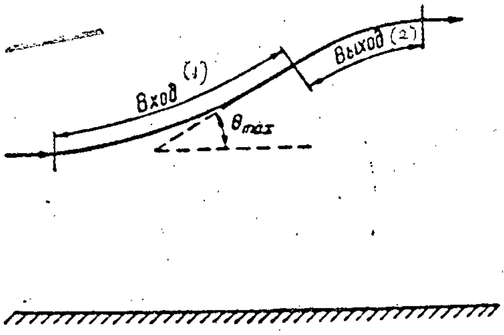
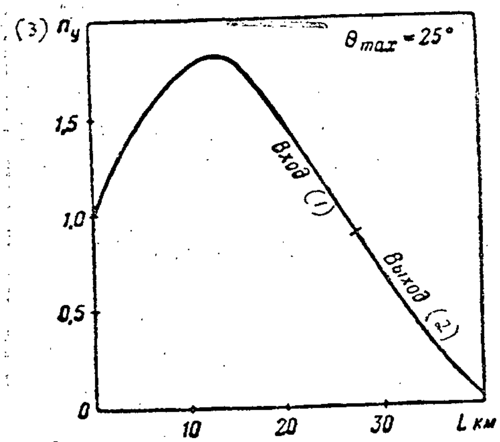


Рис. 1.



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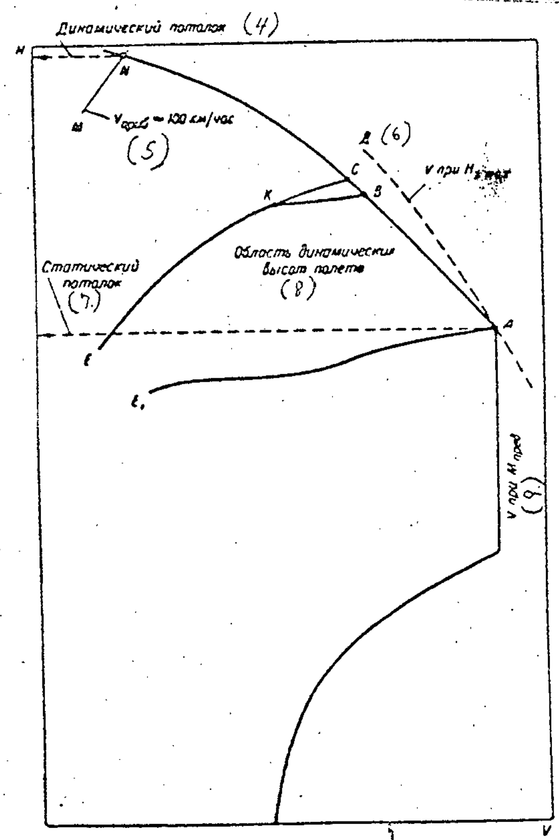

Рис. 3.

1. Entry
2. Departure
3. G Force
4. Dynamic ceiling
5. V_{max}--100 kilometers per hour
6. D
7. Absolute ceiling
8. Area of dynamic heights of flight
9. V when M_{max}

It Has Demonstrated Its Value in Practice -- Lt Col V. S. PONAMAREMKO and Capt V. S. SOSNIN (p 36)

Text:

In our chast' the TL-1 and TL-2 Trainers are widely used for the joint training of pilots, GCI controllers and GCA operators. It [training] is brought about by alternately conducted programmed "flights" and intercepts, and also by executing intercepts and landing approaches in accordance with the plan of a single flight. Joint training brings positive results. For example, upon first being designated GCI controller, it is sufficient to give an officer 15-20 "visits" in the trainer and he begins to work confidently at the plan position indicator when directing the fighters. As far as pilots are concerned, such training serves to improve the quality of their interception of aerial targets.

Trainers permit pilots to work out the following problems: the flight regime during interception (given or programmed); the rate of approach to the target; accuracy in the execution of commands given by controllers; decreasing altitude from a given regime and making a landing approach; flight to another airfield, acting on a new orientation and other elements of intercept flights.

By using trainers, controllers can work out all elements of computation directly related to interception, in particular: computation of line of intercept; visual estimation of the maneuver of the target, its course and speed; determination of turn distance and the moment to cut in or cut out the "afterburner;" selection of the method of guidance and its practical application; determination of the speed of closing with the target; transfer of fighter control; descent and ground control (zavod) of the fighter in landing from the intercept boundary line in complex meteorological conditions and also under minimum weather; repeated guidance; and navigation by sight estimation, necessary for tracking with the plan position indicator.

It is necessary to prepare the trainer for work in the following way. After turning it on, place itinerary notes and a clean sheet of paper under the pencil, and "fly" one minute at a speed of 600 kilometers per hour (the obtained segment will also be a valuable division of the "indicator" -- 10 kilometers). On a Whatman sheet draw the radar "indicator" of centimeter range, then lay it on the table-coordinator and cover the tracing paper. The trainer is ready for work.

Using the trainer's two-way communication it is possible to conduct "tracking" or "flight to intercept."

A free controller (training leader) or pilot marks the target on the imitator of the indicator with a pencil of any color. The mark of the fighter is the end of the pencil itinerary notes. If the trainer is located in the Control Center building, then the situation of the targets is suitably plotted with the aid of the plotter, by telephone. When sending away the fighter from the target at 100 kilometers and more the intersection of the target is plotted after a minute, and when sending away at 100 - 50 kilometers per hour --

after a half minute, when information is spontaneous -- after one scanning revolution centimeter range radar. One can maneuver the target as one pleases, conforming to the capabilities of the trainers.

A positive [factor] in the use of trainers is the fact that there is no need to make any constructive changes in them. For full use of the TL-2 one can place a sighting unit in the cabin to determine range. Data can be fed into this unit by mounting the potentiometer on a piece of guaze or can be fed from the control table by actually approaching the target.

<u>Determining the Degree of Combat Readiness of Apparatus</u> -- Engr-Capt V. V. BALYKIN (pp 37-40)

Abstract:

The article is based on the premise that the coefficient of combat readiness (K_{bg}) is one of the basic "operational and tactical criteria" for determining maintenance needs of radioelectronic apparatus and is determined by the formula $K_{bg} = \frac{t_1}{t_1 \quad t_{pr}}$, where t_1 is the average time of repair work of the examined apparatus and where t_{pr} is the average time required to detect and eliminate one defect. The author explores various components of the above formula and its use in determining the "coefficient of intensive maintenance" of radioelectronic apparatus.

Control of a Radar Podrazdeleniya -- Engr-Lt Col A. I. TITKOV (pp 40-42

Text:

One of the most important conditions for the successful execution of a combat mission by a radar podrazdeleniye is the close control of all actions of personnel by the commander. In modern battle transient changes in the air situation are such that the commander is obliged to make decisions in an exceptionally short time. Let us examine briefly the work of the commander in all stages of controlling the podrazdeleniye. For this purpose let us separate this work into stages and analyze each of them.

First Stage -- Evaluation of the air situation. The essence of the work at this stage consists of the following. Before making a decision the podrazdeleniye commander comprehensively analyzes and evaluates the known air situation. The basic source of information for such analysis is the information received through the warning main channels. At this moment one must above all evaluate the air enemy from the tactical side: establish the nature of the target, its speed, altitude, and course, and also determine the possibility of the enemys executing an anti-radar maneuver (by altering course, speed altitude) and employing radar interference.

If the podrazdeleniye commander successfully handles this mission, then he, undoubtedly, will have made the correct decision and will have fulfilled, as much as possible, the requirements for the entire air situation.

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Second Stage -- Making decisions and executing the missions.

It is expedient to break up this stage into 2 time periods: the first -- prior to the target's entry into the zone of detection of the radar podrazdeleniya; and the second -- during its entry. What elements comprise the control of the podrazdeleniye in each period?

The basic work of the commander prior to the target's entry into the podrazdeleniye's zone of detection is the calculation of approach time, that is, the time prior to the target's entry into the zone of detection. It is necessary to know this time in order to give the command to switch-on radar at the right moment. The fact is, that switching on the radar prematurely can lead to its detection by an air enemy who has available corresponding means of radar detection and neutralization by means of radar interference. Turning on the radar too late results in prevention of the execution of the combat mission.

Calculation of approach time is made in accordance with an emprical formula, which covers all elements of delay:

$$D_{vkl} = D_{obn}\ (Hts)\quad \frac{V}{60t_1}\quad \frac{V}{60t2}\ ,$$

where D_{vkl} = distance between the location of the radar site and the line at which the command to turn it on is given;

D_{obn}(Hts) = range of detection of the radar times the altitude of the target;

t_1 -- Time the radar is switched on;

t_2 -- Lag time of information received through warning channels.

Let us examine the following example. At time T_1 (see drawing) information about the target has been received at the Control Post: enemy aircraft, flying at altitude HN. The podrazdeleniye commander first of all must determine the speed and course of the target, which is required in order to make the correct decision. It is easy to determine the indicated parameters on the podrazdeleniye plotting board with the aid of simple computors and uncomplicated tables, which contain the most significant tactical and technical characteristics of the basic types of modern military aircraft. Having determined the speed and course of the target and knowing its altitude, the commander can, using the formula introduced above, calculate the approach of this target. The drawing shows the sequence of the commander's work to determine the approach time and select the moment to give the command to turn on the radar.

The initial data for calculation in a given case will include: V -- the speed of the target in kilometers per hour; t_1 -- the time the radar is switched on, the amount of time will depend on the type of radar and the time for each station is determined separately; t_2 -- the lag time of information received through warning channels.

Let us say that a podrazdeleniye has two sites -- Radar No 1 and Radar No 2. For Radar No 1 let t_1 = N min. and t_2 = P min. Accordingly, N' min. and P' min. will be used for Radar No 2. If it is accepted that the D_{obn} of Radar No 1 times altitude H is M kilometers, and of Radar No 2 is M' kilometers, then, having placed a value to our formula, we have:

D_{vkl} for Radar No 1 = M km $\frac{V}{60}$ N $\frac{V}{60}$ P = L km; D_{vkl} for Radar No 2 = M' km $\frac{V}{60}$ N' $\frac{V}{60}$ P' = L' km.

Therefore, the command to switch on the radar is given when the target crosses a line located at a distance of the L km (for Radar No 2 -- L' km) from the radar site. In this case when the target enters the podrazdeleniye zone of detection it will be detected at the right time, and the enemy is deprived of the possibility of making an earlier determination of the radar's location and, consequently, of jamming it.

However, the actions of the commander in directing the podrazdeleniye prior to the entry of the target into the zone of detection is not limited to this. He must also check the combat readiness of the radar and control post crews and the means of communication, must report to higher control posts about receipt of target warning, and brief the radar chiefs on the mission.

When organizing the mission the podrazdeleniye commander must indicate to the radar chiefs the type of search, the work regime of the station indicators and, above all, tell the site [radar] operators where to look for the target. The manner in which the podrazdeleniye commander gives pointers to the radar chiefs must be laconic. The radar chiefs must report a tentative time at the expiration of which the target will enter the zone of radar detection. Subsequently, as the target comes closer this time must, accordingly, become more exact.

When the target enters into the radar zone of the podrazdeleniye the commander reports to higher control posts on the detection of the target, indicating its azimuth and range, and also its characteristics. In the event of detection of low flying targets, and also of targets with a small reflective surface, the time for preparing the report and the report itself must, of course, be brief.

The commander compares target data, received in the warning, with the radar podrazdeleniye's data, to ascertain that the sites have detected the assigned target. It should be pointed out here that the calculation of lag time is necessary as long as the coordinates, received with the warning, on the one hand, and these of the radar on the other, are unequal. Some commanders do not consider this circumstance in the course of operations, which can lead to confusion and to incorrect information for the sommand in a complex air situation.

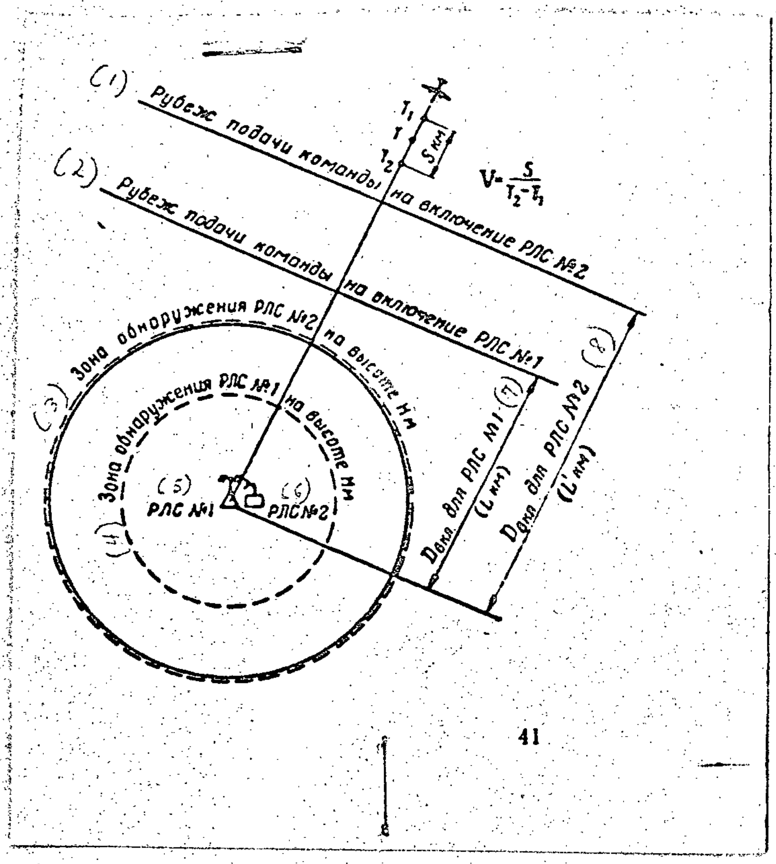
The functions of the commander directing a podrazdeleniye when a target enters into the detection zone, and subsequently, when implementing control, must include, in our opinion, the establishment of a rate of information be forwarded to higher control posts. The commander is obligated in this case to proceed from the importance of the target. Obviously, information on a target moving to a sector of responsibility should be given more often than on another. Therefore, the capabilities of his podrazdeleniye's channels of communication must always be taken into account.

A very important problem in control is the correct assignment of targets among radar podrazdeleniye. The basic mission of the commander consists of issuing parallel reports from several radars on one target. Here everything depends on the experience of the commander, on the level of his tactical training and skill in becoming correctly oriented to the air situation. Each change in the air situation must be considered and must introduce corresponding amendments to earlier instructions.

Giving instructions is only one side of the commander's actions when directing a podrazdeleniye. The second, and no less important part of his work consists of exercising control over the execution of issued orders. In the first place it is necessary that radar crews follow modern procedures of target detection, and that operators correctly determine the target's characteristics. The commander is also obliged to ensure that the established rate of transmitting data on the targets and the correct application by chiefs of technical and tactical radar equipment is maintained, permitting fuller utilization of the combat capability of the site, including the shifting of the directivity pattern in the vertical plans, increasing the scale of the indicator, cutting off of scaled markers and others.

Among the commander's obligations when directing the podrazdeleniye there is also the responsibility over the regular work of all radar sites and control centers when the enemy employs strong radar interference or weapons of mass destruction, and also the leadership of the PVO and ground defense podrazdeleniye. Naturally, the dimensions of this article do not permit a detailed elucidation of all facets of the activities of a radar podrazdeleniye commander in battle.

This is only a summary of the basic stages of directing a podrazdeleniye during the period when a combat mission to detect and control (provodka?) air targets is received.



1. Line at which the command to switch on Radar No 2 is given
2. Line at which the command to switch on Radar No 1 is given
3. Zone of detection of Radar No 2 at altitude HM
4. Zone of detection of Radar No 1 at altitude HM
5. Radar No 1
6. Radar No 2
7. D_{vkl} for Radar No 1
8. D_{vkl} for Radar No 2

[redacted]

NATO Air Forces -- Weapons of Aggression -- Col B. V. ALEKSANDROV (pp 43-45)

Abstract:

The article the "aggressive" mission and describes the types of aircraft of the NATO Air Forces, based on materials from the Western press.

Competently Operate Equipment and Hold it in a State of Combat Readiness -- Engr-Col A. B. UMANETS and Engr-Sr Lt V. V. NEKRASOV (pp 46-48)

Abstract:

The authors discuss two methods for improving the quality of equipment maintenance conducted by radiotechnical troops. The first of these is the carrying out of a weekly and monthly preventive inspection on all equipment simultaneously. Thus, under this method, when "chast' specialists carry out maintenance work it is easier to render the necessary aid to the podrazdeleniya and more correct planning of visits of the KRAS [apparently a repair service] is possible." In some podrazdeleniya weekly and monthly inspections have shortened maintenance work on radar apparatus by 2-3 times, according to the authors. The second method described in the article is an annual preventive inspection carried out jointly by crews of the RLS (radar station) and the KRAS directly in "stationary shops" of the chast'.

Skillfully Plan Innovational and Inventive Work -- Col F. V. YUKHNIN (pp 49-51)

Excerpts:

The successes of our innovators and skilled personnel is, in the main, a result of the efficient planning of innovational work and the initiation of checks of plan fulfillment....

Experience shows that it is more expedient to plan for six months or for each training period, with subsequent adjustments. Of course, such plans must be made with the direct participation of commanders, political workers and engineer-technical personnel of the chast' and reflect the organization and theme of innovational work....

....Such a plan should contain the following parts.

The first part should include organizational problems connected with the training prescribed for inventiveness (orders, instructions, etc.); planning and informing all personnel of thematic meetings on innovation and invention; conducting meetings with officers and meetings of personnel on themes devoted to inventive work, and also meetings with organizers in podrazdeleniya....

The second part reflects practical tasks of the commission for invention which include: meetings with oral reports by podrazdeleniya commanders and commission members on the status of inventive work; receipt, registration, and examination of suggestions to be acted upon; selection of the most valuable of those, which also offer interest for other chasti; and offering these suggestions, in some instances, for introduction on a wider scale....

In the third part measures are planned for technical propaganda and the increased technical knowledge of personnel. Included here are: lectures and talks on the newest achievements in science and technology, on the significance of the work of servicemen to increase combat readiness and improve the combat training of the chast'; and thematic conferences....

The fourth part of the plan is devoted to popularizing leading experience in inventive work. As a rule, it reflects questions on training and on the conduct of semi-annual and annual conferences, innovational and inventive exhibitions, and innovational evenings....

... the primary mission of commanders, political organs, and particularly invention commissions consists in exercising thorough and daily control over the realization of plans for innovative and invention work.

Technical Competitions in the School -- Engr-Col S. M. AKSEL'ROD (pp 52-53)

Abstract:

The author cites the value of monthly technical competitions in electronics, radio engineering, radar, etc., to impart to the future officer a deeper understanding of the physical processes as a result of having studied mechanisms and diagrams, a consolidation of skill in executing tasks, carrying out calculations, compiling diagrams and graphs, and a better knowledge of and liking for his specialty.

The Influence of Filament Voltage on the Service Time of Electron Tubes -- Engr-Sr Lt I. P. FOMENKOV (pp 54-57)

Abstract:

Concludes that the reduced use of filament voltage, with periodic "activation," results in a significant increase in the service time of electron tubes, and in some cases improves the technical performance of the apparatus. According to the author this also has an economic effect and increases the dependability of radioelectronic equipment.

Maintenance of Diesel Power Plants -- Engr-Maj M. I. BELOKOPYTOV (pp 58-60)

Abstract: Outlines detailed step-by-step procedures which in the opinion of the author should be applied during weekly, monthly, semi-annual, annual, and triennial maintenance work on diesel power plants.

Maintenance Dependability of Aviation Equipment -- Engr-Lt Col G. M. SAGAYDACHNYKH, Candidate of Technical Sciences (pp 61-65)

Abstract:

Discusses methods for ensuring dependable work with aviation equipment, particularly the method rendered by the theory of dependability (teoriya nadezhnosti). According to the author, "the basic tasks of this theory are the analysis of factors influencing dependability, the exposure of regular manifestations of malfunctions on the basis of which more active measures for their prevention may be worked out.

[redacted]

The author notes that there are several difficulties in determining a "numerical expression of dependability." The first difficulty lies in the great number and variety of factors to be considered, the second in the difficulty of creating laboratory conditions equal to actual conditions for maintaining equipment. For these reasons the author suggests the use of the statistical method for determining numerical values and for resolving questions of dependability.

Following a discussion of the theory of dependability and the statistical method the author concludes that the theory of dependability depends upon statistical data on malfunctions. Therefore, collection of this data should be given the greatest attention. The production and analysis of such data by methods of the theory of dependability under unit conditions will be a great aid in the competent maintenance of aviation equipment, and also in the establishment of more precise and dependable aircraft.

What are Considered Malfunctions and Faults in Radioelectronic Apparatus -- Engr-Lt Col A. V. BODUNOV (pp 66-67)

Abstract:

Largely concerned with defining the terms malfunction (otkaz) and fault (neispravnost') as they apply to the maintenance of radio-electronic apparatus. The term malfunction is defined as "any incident serving to prevent the execution of a task during the period of combat performance," and fault as "deviations from norms and requirements." According to the author, a "full understanding of and correct regard for these terms permits the regulation of maintenance and the perfection of the apparatus available to troops."

Automatic Luminous Panel -- Sr Lt U. A. TOOTSI (pp 68-70)

Abstract:

Describes in text and diagrams the construction of an automatic luminous panel, with which it is possible to represent numerical information visually. Components described are the control panel, stands with selectors, and a stencil with numbers made of black plastic.

ICBM Detection Radar -- Engr-Maj A. I. KORNIYENKO, Candidate of Technical Sciences (pp 71-76)

Abstract:

Based on materials from the foreign press, describes the operation of the US AN/FPS-50 radar, which is designed for "the long range detection of ICBMs, determination of their trajectory, target designation, and for determining the points of launch and impact of the rockets."

Only Two Days of War. . . -- Col M. V. OSTAPCHUK (pp 77-79)

Abstract:

Describes PVO activities in Murmansk on 4 and 5 September 1942

"Guarding the Air Boundaries of the Soviet Motherland" -- Col Ya. K. KEKALO (pp. 79-80)

Abstract:

The author urges that the album Guarding the Air Boundaries of the Soviet Motherland, containing a history of the PVO strany troops, be disseminated to all PVO units.